

WHAT IS CLAIMED IS:

1. A projection lens shifting mechanism comprising:

a driving apparatus, having a central axis and for receiving an external torque;

5 a first supporting apparatus, secured on a base plate for supporting said driving apparatus;

a transmitting apparatus, driven by said driving apparatus for changing direction of the torque transmitted by said driving apparatus;

10 a movable plate, on which a projection lens is mounted, the movable plate being in contact with said transmitting apparatus to be driven by said transmitting apparatus to translate in a perpendicular direction with respect to said central axis of said driving apparatus; and

15 a second supporting apparatus, secured on said base plate for supporting said movable plate and restricting a direction that said movable plate translates.

2. The projection lens shifting mechanism claimed in Claim 1, wherein said transmitting apparatus comprises:

a worm, driven by said driving apparatus;

5 a supporting bar, secured on said base plate and being perpendicular to said base plate; and

a transmitting wheel, joined to said supporting bar, said transmitting wheel having a plurality of gear teeth engaging with said worm, said transmitting wheel having a cam in an area contacting with said movable plate to push said movable plate.

3. The projection lens shifting mechanism claimed in Claim 1, wherein said movable plate further comprises a guide slot, and said transmitting apparatus comprises:

a worm driven by said driving apparatus;

- 5 a supporting bar secured on said base plate and being perpendicular to said base plate; and

10 a transmitting wheel joined to said supporting bar, said transmitting wheel having a plurality of gear teeth engaging with said worm, said transmitting wheel having a rod placed in said guide slot to push said movable plate.

4. The projection lens shifting mechanism claimed in Claim 2, further comprising at least one reduction pinion disposed between said worm and said transmitting wheel.

5. The projection lens shifting mechanism claimed in Claim 2, wherein said first supporting apparatus comprises two pedestals and a fixed bar, said two pedestals being secured on said base plate, said fixed bar is secured on said two pedestals, and said worm and said transmitting wheel are joined to said fixed bar.

6. The projection lens shifting mechanism claimed in Claim 1, wherein

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said second supporting apparatus comprises two pedestals and a fixed bar, said two pedestals are secured on said base plate, said fixed bar is secured on said two pedestals, and said worm and said transmitting wheel are joined to said fixed bar.

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7. The projection lens shifting mechanism claimed in Claim 6, wherein said movable plate further comprises two sleeves that are slidably joined to said fixed bar.
8. The projection lens shifting mechanism claimed in Claim 1, further comprises an elastic member having one end secured to said base plate and the other end secured to said movable plate.
9. The projection lens shifting mechanism claimed in Claim 8, wherein said elastic member is a spring.
10. The projection lens shifting mechanism claimed in Claim 1, further comprising a third supporting apparatus which is secured on said base plate for supporting said movable plate and restricting a direction that said movable plate translates.
11. The projection lens shifting mechanism claimed in Claim 10, wherein said third supporting apparatus comprises two pedestals and a fixed bar, said two pedestals are secured on said base plate, said fixed bar is secured on said two pedestals, and said worm and said transmitting wheel are joined to said fixed bar.
12. The projection lens shifting mechanism claimed in Claim 11, wherein said movable plate further comprises a U-shaped jaw that slidably clamps said fixed bar.

13. A projection lens shifting mechanism comprising:

a driving wheel, having a central axis and for receiving an external torque;

a worm, driven by said driving wheel;

5 a transmitting wheel, having a plurality of gear teeth engaging with said worm for changing a direction of the torque transmitted by said driving wheel; and

10 a movable plate, on which a projection lens is mounted, being in contact with said transmitting wheel to be driven by said transmitting wheel to translate in a perpendicular direction with respect to said central axis of said driving wheel.

14. The projection lens shifting mechanism claimed in Claim 13, further comprising at least one reduction pinion disposed between said worm and said transmitting wheel.

15. A projection lens shifting mechanism comprising:

a first driving apparatus having a central axis and receiving an external torque;

5 a first supporting apparatus secured on a base plate for supporting said first driving apparatus;

a first transmitting apparatus driven by said first driving apparatus for changing a direction of the torque transmitted by said first driving apparatus;

10 a first movable plate being in contact with said first transmitting apparatus to be driven by said first transmitting apparatus to translate in a perpendicular direction with respect to said central axis of said first driving apparatus;

15 a second supporting apparatus secured on said base plate for supporting said first movable plate and restricting a direction that said first movable plate translates;

a second driving apparatus having a central axis perpendicular to the central axis of said first driving wheel;

a third supporting apparatus secured on a base plate for supporting said second driving apparatus;

20 a second transmitting apparatus driven by said second driving apparatus for changing a direction of the torque transmitted by said second driving apparatus;

25 a second movable plate, on which a projection lens is mounted, being above said first movable plate, said second movable plate being in contact with said second transmitting apparatus to be driven by said second transmitting apparatus to translate in a perpendicular direction with respect to said central axis of said second driving apparatus; and

30 a fourth supporting apparatus secured on said first movable plate for supporting said second movable plate and restricting a direction that said second movable plate translates.

16. The projection lens shifting mechanism claimed in Claim 15, wherein said first transmitting apparatus comprises:

a worm driven by said first driving apparatus;

5 a supporting bar secured on said base plate and being perpendicular to said base plate; and

10 a transmitting wheel joined to said supporting bar, said transmitting wheel having a plurality of gear teeth engaging with said worm, said transmitting wheel having a cam in an area contacting with said first movable plate to push said first movable plate.

17. The projection lens shifting mechanism claimed in Claim 15, wherein said first movable plate further comprises a guide slot, and said first transmitting apparatus comprises:

a worm driven by said first driving apparatus;

5 a supporting bar secured on said base plate and being perpendicular to said base plate; and

10 a transmitting wheel joined to said supporting bar, said transmitting wheel having a plurality of gear teeth engaging with said worm, said transmitting wheel having a rod placed in said guide slot to push said first movable plate.

18. The projection lens shifting mechanism claimed in Claim 16, further comprising at least one reduction pinion disposed between said worm and said transmitting wheel.

19. The projection lens shifting mechanism claimed in Claim 16, wherein said first supporting apparatus comprises two pedestals and a fixed bar, said two pedestals are secured on said base plate, said fixed bar is secured on said two pedestals, and said worm and said transmitting wheel are joined to said fixed bar.
20. The projection lens shifting mechanism claimed in Claim 15, wherein said second supporting apparatus comprises two pedestals and a fixed bar, said two pedestals are secured on said base plate, said fixed bar is secured on said two pedestals, and said worm and said transmitting wheel are joined to said fixed bar.
21. The projection lens shifting mechanism claimed in Claim 20, wherein said first movable plate further comprises two sleeves that are slidably joined to said fixed bar.
22. The projection lens shifting mechanism claimed in Claim 15, further comprising a first elastic member having one end secured to said base plate and the other end secured to said first movable plate.
23. The projection lens shifting mechanism claimed in Claim 22, wherein said first elastic member is a spring.
24. The projection lens shifting mechanism claimed in Claim 15, wherein said third supporting apparatus comprises two pedestals and a fixed bar, said two pedestals are secured on said base plate, said fixed bar is secured on said two pedestals.
25. The projection lens shifting mechanism claimed in Claim 24, wherein said first movable plate further comprises a U-shaped jaw

that slidably clamps said fixed bar.

26. The projection lens shifting mechanism claimed in Claim 15, wherein said fourth supporting apparatus comprises two pedestals and a fixed bar, said two pedestals are secured on said base plate, said fixed bar is secured on said two pedestals.

27. The projection lens shifting mechanism claimed in Claim 26, wherein said first movable plate further comprises a U-shaped jaw that slidably clamps said fixed bar.

28. The projection lens shifting mechanism claimed in Claim 15, wherein said second transmitting apparatus comprises:

a worm driven by said second driving apparatus;

5 a supporting bar secured on said base plate and being perpendicular to said base plate; and

10 a transmitting wheel joined to said supporting bar, said transmitting wheel having a plurality of gear teeth engaging with said worm, said transmitting wheel having a cam in an area contacting with said second movable plate to push said second movable plate.

29. The projection lens shifting mechanism claimed in Claim 15, wherein said second movable plate further comprises a guide slot, and said second transmitting apparatus comprises:

a worm driven by said second driving apparatus;

5 a supporting bar secured on said base plate and being perpendicular to said base plate; and

 a transmitting wheel joined to said supporting bar, said transmitting wheel having a plurality of gear teeth engaging with said worm, said transmitting wheel having a rod placed in said guide
10 slot to push said first movable plate.

30. The projection lens shifting mechanism claimed in Claim 28, further comprising at least one reduction pinion disposed between said worm and said transmitting wheel.

31. The projection lens shifting mechanism claimed in Claim 28, wherein said third supporting apparatus comprises two pedestals and a fixed bar, said two pedestals are secured on said base plate, said fixed bar is secured on said two pedestals, and said worm and said
5 transmitting wheel are joined to said fixed bar.

32. The projection lens shifting mechanism claimed in Claim 31, wherein said second movable plate further comprises a U-shaped jaw that slidably clamps said fixed bar.

33. The projection lens shifting mechanism claimed in Claim 15, further comprising a second elastic member having one end secured to said first movable plate and the other end secured to said second movable plate.

34. The projection lens shifting mechanism claimed in Claim 33, wherein said second elastic member is a spring.

35. A projection lens shifting mechanism comprising:

a first driving apparatus, having a central axis and for receiving an external torque;

a first worm, driven by said first driving apparatus;

5 a first transmitting wheel, having a plurality of gear teeth engaging with said first worm for changing a direction of the torque transmitted by said first driving apparatus;

10 a first movable plate, being in contact with said first transmitting wheel to be driven by said first transmitting wheel to translate in a perpendicular direction with respect to said central axis of said first driving apparatus;

a second driving apparatus, having a central axis perpendicular to the central axis of said first driving wheel;

a second worm, driven by said second driving apparatus;

15 a second transmitting wheel, having a plurality of gear teeth engaging with said second worm for changing a direction of the torque transmitted by said second driving apparatus; and

20 a second movable plate, on which a projection lens is mounted, being above said first movable plate, said second movable plate being in contact with said second transmitting apparatus to be driven by said second transmitting apparatus to translate in a perpendicular direction with respect to said central axis of said second driving apparatus.

36. The projection lens shifting mechanism claimed in Claim 35, further comprising at least one reduction pinion disposed between said first worm and said first transmitting wheel.
37. The projection lens shifting mechanism claimed in Claim 35, further comprising at least one reduction pinion disposed between said second worm and said second transmitting wheel.